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# FARM & HOME SCIENCE

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UTAH STATE AGRICULTURAL COLLEGE

Vol. 14 No. 1

March 1953

## Broiler Production A PROMISING NEW INDUSTRY

By EARNEST M. MORRISON and THOMAS I. GUNN

PRODUCTION of broilers in Utah will reward the efficient producer rather liberally and will pay the average producer going wages for the time spent managing and caring for the enterprise. Such are the general conclusions drawn from an economic study of the broiler enterprise conducted by the Utah Station. One hundred twenty-eight lots of broilers averaging 3,266 birds per lot, raised by 78 producers in Utah, were included in the study. Since the gross income from the production of broilers reached \$1,322,000 in 1951 compared to about \$629,000 in 1950, many inquiries have been made of the profitability of this new farm enterprise.

When all the costs of production including the operator's own time and capital were subtracted from the gross receipts, a net return of a minus \$11.00 per thousand birds raised resulted. But when all costs of production except the operator's own time were subtracted from the gross receipts, the return to the operator for his labor and management was \$84.00 per thousand broilers raised.

In arriving at a total cost figure, all inputs regardless of their origin, whether produced on the farm or purchased, are charged against the enterprise at market rates. Costs averaged 96 cents per bird raised, or 30.9 cents per pound. Of these costs feed accounted for approximately 60

percent, chicks 20 percent, labor 11 percent, and the balance of 9 percent was miscellaneous charges including fuel, litter, water, electricity, taxes, insurance, medicine, and interest charge for the use of capital (table 1).

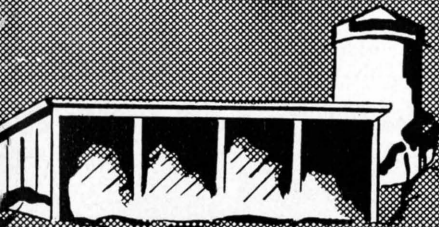
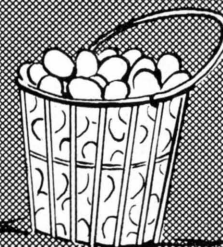
### Feed Costs 60 Percent of Total

Feed costs amounted to \$571.00 per 1,000 birds raised, or 57 cents per broiler. Feed cost per pound of bird raised averaged 18 cents with a range from a low of 14 cents to a high of 32 cents per pound. One hundred and fifteen lots were raised on an all-mash ration. One producer mixed his own broiler mash. A ration composed of quantities of wheat, corn, and other grains, used with broiler, starting, or growing mash, was fed to 13 lots. The average cost of all feed converted to a hundredweight basis was \$5.44.

### Cost and Source of Chicks

The average price paid was 18 cents per chick per 1,000 started or 19 cents per broiler raised. Approximately 94 percent of the 128 lots were New Hampshires. About 47 percent of the chicks started came from hatcheries in California, Oregon, or Washington. Idaho hatcheries supplied 43 percent of the chicks in this study, but this figure shows some bias since many northern Utah producers were under contract with a firm with headquarters in Idaho that supplied chicks from Idaho hatcheries. Only 10 percent of the chicks in this study came from hatcheries located within Utah.

*E. M. MORRISON is associate professor and T. I. GUNN is a graduate assistant in the Department of Agricultural Economics and Marketing. Professor Morrison is a regular contributor to Farm and Home Science.*



### Labor Costs

Labor was the third most important item of cost in broiler production. The average charge for labor per hour was \$1.05. About 98 hours of man labor were spent to raise each 1,000 broilers. Operator and family labor represented about 92 percent and hired labor 8 percent of the total hours required to raise a lot. Daily routine or chores accounted for 85 percent of the total labor requirements.

Fuel, litter, water, lights, and medicine, which may be thought of as the material costs of brooding, averaged about 3 cents per chick raised.

### Receipts

Total receipts averaged 95 cents per bird or 30.6 cents per pound of broiler raised. Broiler sales represented 98.7 percent of the total receipts. The remaining receipts included the value of the birds eaten at home, the value of the litter, and refunds. About 43 pounds of broiler meat per lot valued at \$13 was retained for home use. The litter was calculated to be worth 70 cents per 100 birds raised.

With the average net returns from broiler production being just slightly negative when all costs are subtracted from the total receipts, it is apparent that some broiler producers were unsuccessful in earning a monetary reward for their management. On the other hand some operators were rewarded rather generously. The third of the broiler lots with the highest net returns per pound had an average of 10 cents net returns per bird (table 2).

Table 1. Cost of producing broilers from 128 lots in Utah, 1951-52

Item	Per 1,000 birds raised			Total cost	Percent total cost
	Unit	Amount	Price per unit		
			dollars	dollars	percent
Feed	cwt.	105	5.44	571	59.6
Chick	chick	1,000	.19	192	20.0
Labor	hours	98	1.05	103	10.7
Housing	dollars			23	2.4
Capital charges:					
Fixed	dollars	1,599	.05	21	2.2
Operating	dollars	592	.06	10	1.0
Fuel				17	1.8
Litter				7	.7
Water and lights				5	.5
Taxes				4	.4
Insurance				3	.3
Medicine				2	.2
Miscellaneous				1	.2
Total				959	100.0

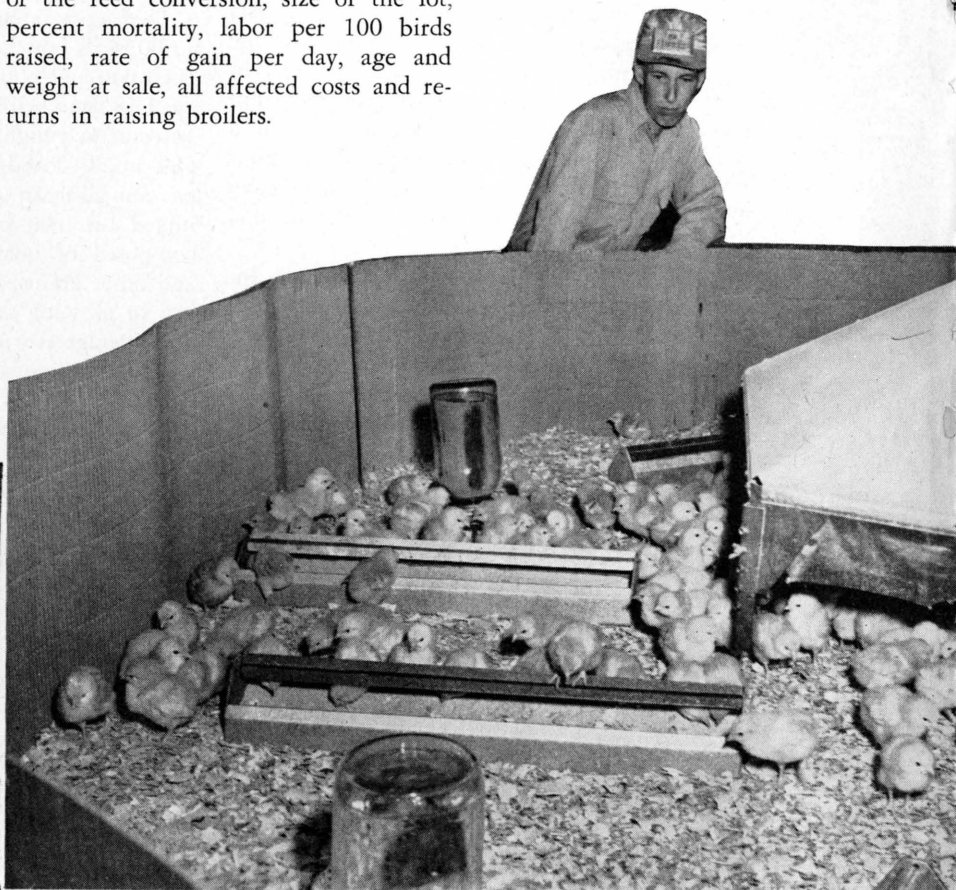
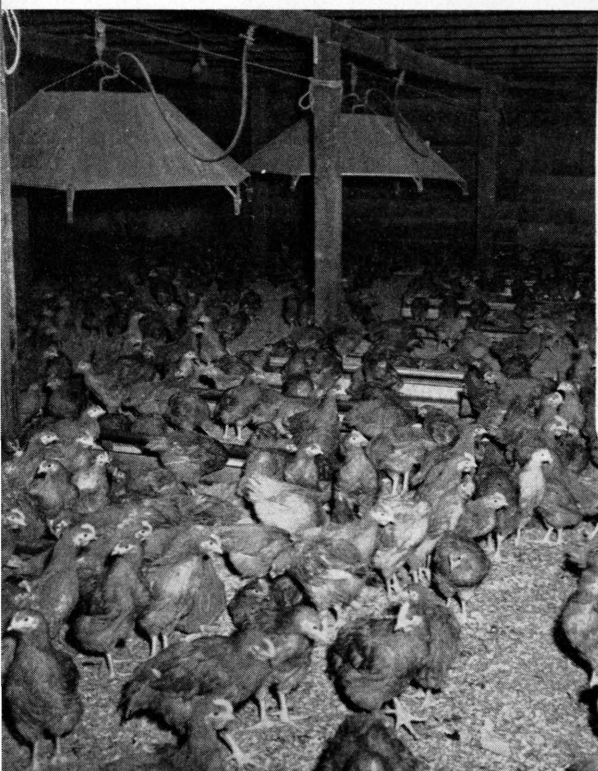
### Factors in Success

It would seem that many factors have an influence on the total success of the broiler enterprise. The pounds of feed required to produce a pound of broiler or the feed conversion, size of the lot, percent mortality, labor per 100 birds raised, rate of gain per day, age and weight at sale, all affected costs and returns in raising broilers.

### Pounds of Feed Per Pound of Gain

The pounds of feed required to produce a pound of broiler was perhaps the most

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The broilers at the left are 7 weeks old. The housing facilities were provided by remodeling an old cattle barn and insulating the walls. The top picture shows chicks one week old started by one of the cooperators in the study as a sideline to obtaining an education at the USAC. This unit was small but efficiently handled

Farm and Home Science



# Are Irrigation Waters Injuring Utah Soils?

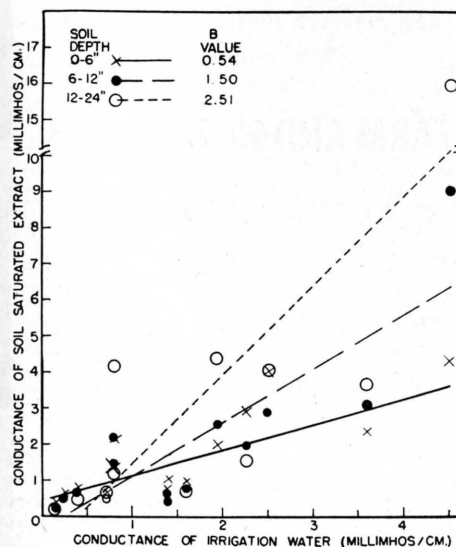
By D. W. THORNE and J. P. THORNE

IRRIGATION waters differ from rain in that irrigation waters always contain some salt whereas rain water is nearly pure. Obviously, if irrigation waters contain large concentrations of salt, soils and crops will be injured. But such low quality waters are usually avoided. Some people believe that ordinary irrigation waters are adding injurious salts to our soils at a dangerous rate and that because of this the productivity of Utah soils is gradually declining. If this idea is true Utah agriculture faces a dismal future and even nonagriculturists who love gardens and flowers may eventually find the state a less pleasant place in which to live. A few years ago detailed investigations were started on this problem by the Utah Agricultural Experiment Station. The studies included detailed analyses of the irrigation waters of the state (published as Utah Agr. Exp. Sta. Bul. 346) and sampling and chemical analysis of many of our soils.

In the soils studies, fields were located that had been irrigated for a number of

DR. D. W. THORNE is head of the Agronomy Department and an authority on arid soils. JAMES P. THORNE is in charge of the Soil Testing Laboratory of the Soil Conservation Service and works cooperatively with the Utah Station.

Fig. 1. Salt increases in soils proportionately to the salt content of waters used to irrigate them



years with waters of a moderately wide range of salt content. There fields were selected so there would be an adjacent field that had not been irrigated. The soils of both the irrigated and the adjacent non-irrigated fields were sampled in close vicinity where the soil was as uniform as possible. Three locations were selected in each field and soil samples were taken from depths of 0-6 inches, 6-12 inches, and 12-24 inches. Fifteen different locations were selected representing 12 different irrigation waters.

Of course, the changes occurring in irrigated soil cannot all be attributed to materials deposited from irrigation water. Crops remove certain elements, some are

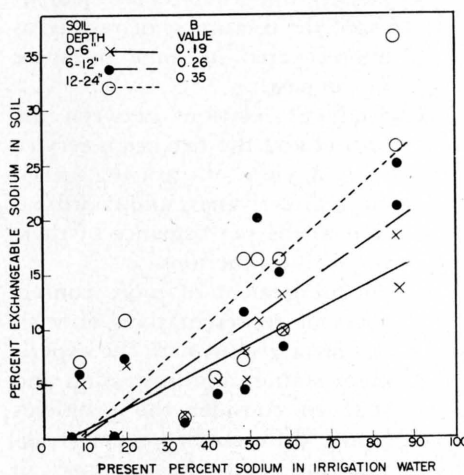


Fig. 2. As the percentage of sodium increases in irrigation waters the soils irrigated tend to accumulate more exchangeable sodium—or tend to become more alkaline

added in fertilizers and farm manures, and erosion, carrying away portions of soils, may change them appreciably. The principal changes that would be expected to result from irrigation water as distinguished from these other factors include an increase or decrease in soluble salts, an increase or decrease in lime content, and changes in the elements adsorbed on the clay and organic matter.

The soil samples were analyzed for salt content (conductance of soil extract), pH, lime content, and exchangeable sodium, potassium, calcium, and magne-

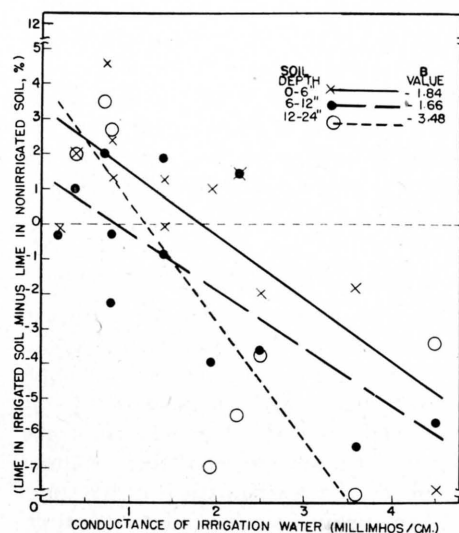


Fig. 3. Lime often increases in soils irrigated with waters low in salt, but it tends to be leached out of soils irrigated with waters high in salt

sium. Changes in lime content were calculated by subtracting the average percent of lime in the soil of each non-irrigated field from the average percent in the adjacent irrigated field. The percent exchangeable sodium represents 100 times the quantity of the exchangeable sodium in soil divided by the total of all exchangeable ions, with the quantities expressed in milli equivalents per 100 grams of soil.

The results obtained indicate that only a small proportion of Utah soils are being reduced in productive capacity through the effects of irrigation water. Some soils are being definitely improved through the leaching away of harmful salts and the replacement of alkali sodium on soil clay by calcium. As expected, the amount of salt in soil was closely related to the amount in irrigation water. This is shown in fig 1.

A second relationship that was also anticipated is an increase in exchangeable sodium with an increase in percent of sodium in water. This is shown in fig. 2.

The content of lime in soil decreased as the quantity of salt in water increased (fig. 3). This had not been anticipated because it was expected some lime might be precipitated in the soil from these

(Continued on page 22)



# Recommendations of the Kelly Report

**I**N the report of a survey of the Utah State Agriculture College recently released by the Kelly Committee and made at the request of the Governor and the Board of Trustees the following findings and recommendations are made in regard to the research program of the Agricultural Experiment Station:

## General Findings and Recommendations

1. The research and service program of the Utah Agricultural Experiment Station is effective and well balanced. The staff is in general capable and well trained. The results of the work of the station have been of great value to the agriculture of the state, and the program now underway promises to provide a sound scientific foundation for future programs in the fields of land utilization, utilization of water resources, and crop and livestock production. The investment by the state in the experiment station system is conservative in comparison with other stations in similar situations but the return on that investment is high. The growth of the station has followed the trend in the country as a whole. Its cooperation with other agencies is outstanding. The centralized administration of the experimental work throughout the state is an advantage to every community. The program of research appears adjusted to meet in a reasonable way as many as possible of the needs of the various segments of agriculture in Utah. There is need for expanded facilities to make the station program as effective as it should be. More well-trained young men should be added to the staff to work under the experienced project leaders now on the faculty, many of whom divide their time between research and teaching.

The compensation for part-time graduate fellowships should be increased in order to attract a more adequate supply of graduate assistants. It will be recognized that such assistants provide one of the most effective and economical means of strengthening research. Such assistants should be re-

cruited on a wide geographical basis both within and without the state.

2. The most important recommendations:

- a. Readjustment of methods of handling budgeted funds so as to facilitate and expedite the research work and to make easy maximum utilization of special equipment and services throughout the station.
- b. Periodic stock-taking by departments and by the station as a whole to facilitate the adjustment of the research programs to the changing needs of Utah agriculture and to the progress of science.
- c. Encouragement of more prompt publication where delays jeopardized the usefulness of results, as has occurred in some instances in the past.
- d. Study of relations between the station and the extension service with a view of insuring maximum effectiveness and coordination in the performance of their respective functions.
- e. Encouragement of more conferences of representatives of various farm groups with the experiment station administration and staff to consider the problems facing different segments of agriculture and the manner in which the station program can best help to meet those problems.

## The Staff

In respect to ability, training, and experience, the staff of the Utah station ranks high among institutions in its class. There appears to be a spirit of loyalty to the interest of the state and a general atmosphere of industry not surpassed in sister institutions. Salaries have not kept pace with trends elsewhere and pose a problem which must be faced. There is a keen interest among the faculty in intelligent efforts to solve problems affecting in any adverse manner the morale or the effectiveness of the staff. In addition to salary and advancement problems, problems relating to retirement poli-

cies and annual leaves appear to deserve consideration and action. The attitude of the staff is manifestly cooperative with those who must bear administrative responsibilities and it is felt that full advantage should be taken of the desire of the staff to help in solving problems of this character as well as in the development of the most effective working program that is possible.

## Salary Levels

It is felt that the salary levels in the Utah station are still dangerously low from the standpoint of maintaining an effective staff. It is understood that some of the ablest staff members have resisted the temptation of higher salary offers in other institutions only because of their loyalty to the state and the institution and their preference for Utah as a place to live and work. In other words the Utah station is not in a satisfactory or safe position in competition with other institutions. It should be able to pay its employees what men of equal training and capacity are receiving in similar institutions over the country. Long experience has shown that the greatest economy as well as effectiveness in research has been achieved as a result of the competence of the project leader. A competent research man avoids waste of time, facilities, and funds through every step of his work. Whatever it costs to hire a man of high research ability and good train-

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## FARM AND HOME SCIENCE

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Address correspondence regarding material appearing in these columns either to the editor or to the author.

More detailed information on the subjects discussed here can often be found in Station bulletins and circulars or may be had through correspondence.

# Growing Newer Varieties Will Result in Increased Yields of Spring Grains in Utah

By ROLLO W. WOODWARD

## Recommended Varieties

Not everyone is growing the better recommended varieties. Some farmers still cling to the old varieties; others send to far away states for varieties recommended for conditions unlike ours; while still others are taken in by fake claims of unscrupulous dealers. The recommended spring barley, Bonneville, has given excess yields over Velvon, Trebi, Gem, and others of from 10 to 20 percent in a number of tests. In addition it has much stiffer straw and is somewhat more resistant to diseases. Overland oats, resistant to both smuts and rusts, and having stiff

short straw, is the most productive oat tested in Utah.

Lemhi wheat is recommended for all spring planting under irrigation. It has outyielded other spring wheat over most of the Intermountain Area.

Corn hybrids including Ohio C38, Utahybrid 680, Pioneer 300, Portwalco 100, and Minhybrid 301 have given good results over most of the state. Others such as Funks G91, G29, and Key 45 show much promise. Further tests may warrant the recommendation of some new corn hybrids for Utah.

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**S**PRING cereals, especially wheat and barley, are becoming much more important to the agriculture of Utah. Spring wheat, normally occupying 50,000 to 70,000 acres, this year was grown on 101,000 acres while barley jumped to 141,000. Oats continue about the same with a total acreage of 44,000 while corn is increasing somewhat to a new high of 36,000 acres. In all, spring grains occupy 328,000 acres of land with a gross income of \$20,554,000 as shown by U. S. Department of Agriculture annual reports. Winter wheat occupies another 332,000 acres with a gross income of nearly \$10,000,000.

While the acreage of spring grains has been expanding the yield likewise has steadily increased as a result of new varieties and better management. It is possible further to increase yields significantly if we use the knowledge now available.

*DR. ROLLO W. WOODWARD is associate agronomist with the Bureau of Plant Industry, Soils, and Agricultural Engineering. He is stationed at Logan and works cooperatively with the Utah Station on wheat, oat, sorghum, and barley production and breeding.*



(Above) Heads of Bonneville, the new high yielding spring barley developed at the Utah Station

(Right) Dr. Woodward points out smut and rust resistant progeny of Lemhi developed through breeding at the Utah Station





# Why Age Carp?

By W. J. McCONNELL

CARP is the most widespread and abundant of the non-game fish in Utah. With ever increasing demands for more protein products in animal feeds the Experiment Station began research in 1948 to obtain information leading to better utilization of this largely unexploited re-

*W. J. McCONNELL is a research assistant in the Department of Wildlife Management where he is working toward his Ph.D. degree.*

source. It has been estimated that carp can produce more protein per acre than any other animal.

Modern water and land-use practices have greatly augmented the habitat suitable for carp. Impoundments, drainage basins for sewage and irrigation water, and water fowl refuges all have added to the possible carp range in Utah.

Until a permanent industry, based on this resource, is established, no really efficient harvest can occur. If we are to have such an industry we must first be able to predict the harvest that may be depended upon. As in all other animal in-

dustries yield depends on the rate of growth of the animal concerned. This is a simple matter for the cattle grower or poultryman as he knows the age of the animal. Fish present a more difficult problem.

## Determining the Age of Carp

Among other things, continued successful fishing operations depend on a method of determining the age of the fish, and thereby knowing the rate of growth. By counting rings on the scales, the age of most fish can be ascertained. Such is not the case with the carp. One of the objectives of the non-game-fish research project was, therefore, to find a reliable method of determining the age of carp. The problem was briefly one of finding a part of the carp's skeletal system, other than scales, that recorded annual fluctua-

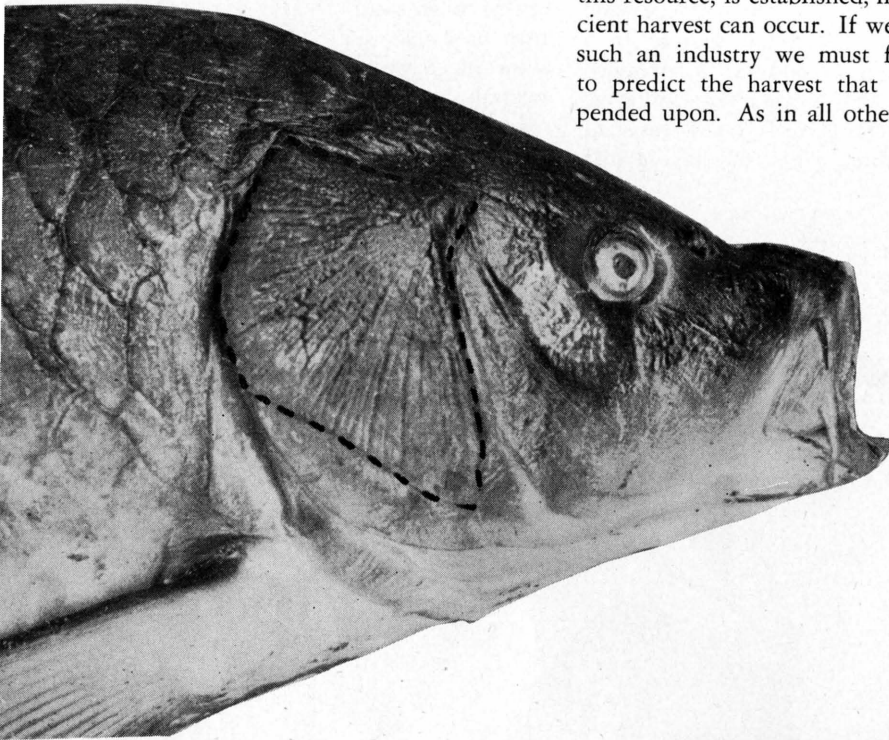
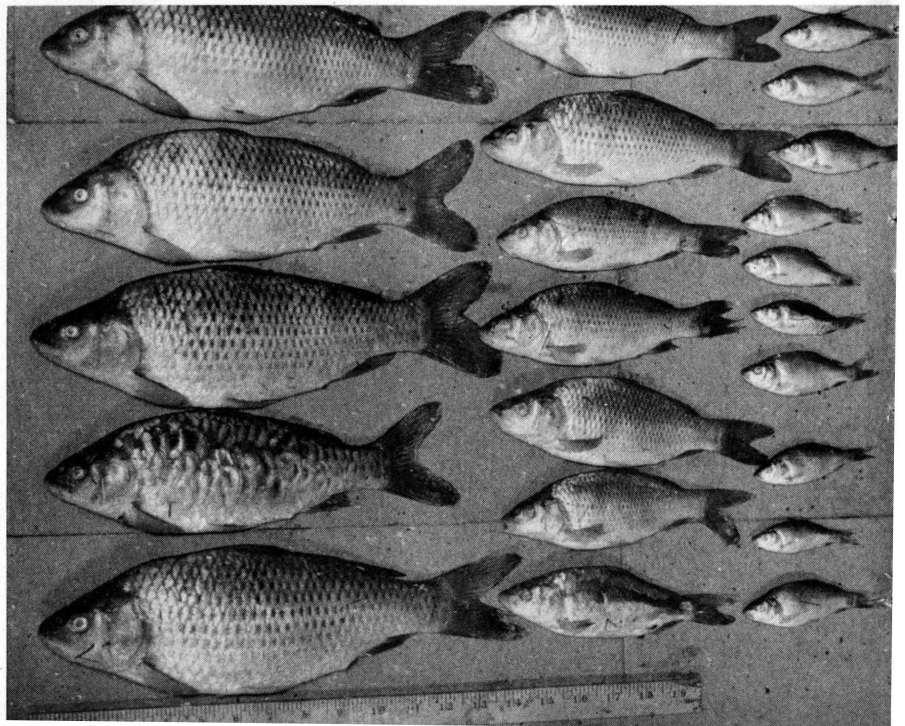
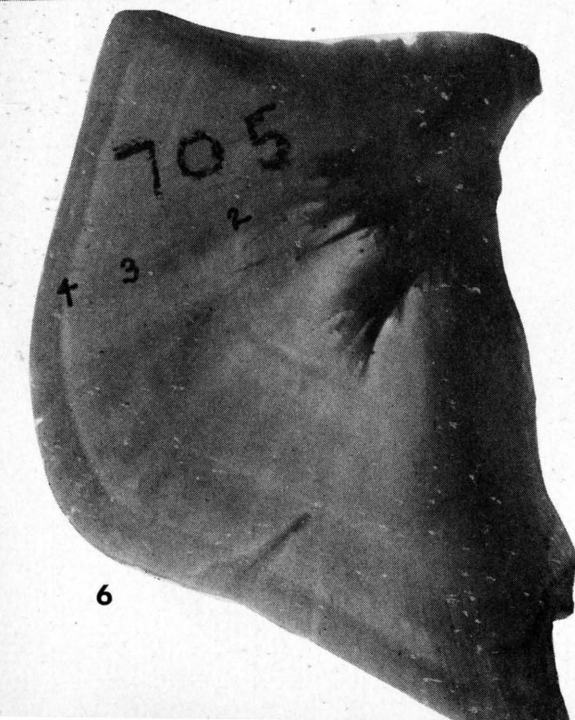


Fig. 1. (Left) Head of a carp indicating outline of gill cover used to determine age

Fig. 2. (Lower left) Gill cover of carp with year marks deposited during past years numbered. The mark deposited at the end of the first year's growth is hidden by supporting structures

Fig. 3. An exceptional size grouping of carp indicating age. The smallest ones are approximately half way through the first growing season, the middle group has been through one and a half growing seasons, and the longest ones have completed two years' of growth and are half way through the third year of growth. The fish were captured in marshland near Corinne





tions of growth in the form of recognizable marks. Various bones in the head and backbone of other species of fish had been demonstrated to be reliable indicators of age. Following this lead it was soon discovered distinct marks were evident on the gill cover.

One of the first pieces of positive evidence was obtained from the gill covers of some young carp which had been marked, released, and later recaptured. The gill covers of these carp all had one mark indicating one completed season of growth since their release. This was known to be the correct age. However, further evidence was needed to make the theory acceptable. It still remained to age large numbers of carp by their gill bones and subject the results to statistical tests. The gill bones of 330 carp, collected at Ogden Bay Waterfowl Refuge, were examined and the ages of the deceased

owners determined. In addition to determining the age, length attained at the end of each past year of growth was calculated. This was accomplished by finding how the ratio of gill-bone size to the length of the carp changed as the carp grew older. It was discovered that small carp had larger gill covers in proportion to their size than large carp. By assuming the growth lines were former margins of the gill cover at earlier stages of growth, the knowledge of gill cover to body-length ratio was applied to find how large each carp was at the time it formed the growth lines. After all past lengths were determined the average length attained at the end of each year of life was calculated. The lengths obtained in this manner agreed closely with lengths of carp determined to be 1, 2, and 3 years old on the basis of size groups. It is not possible to tell the age of fish on the basis of size

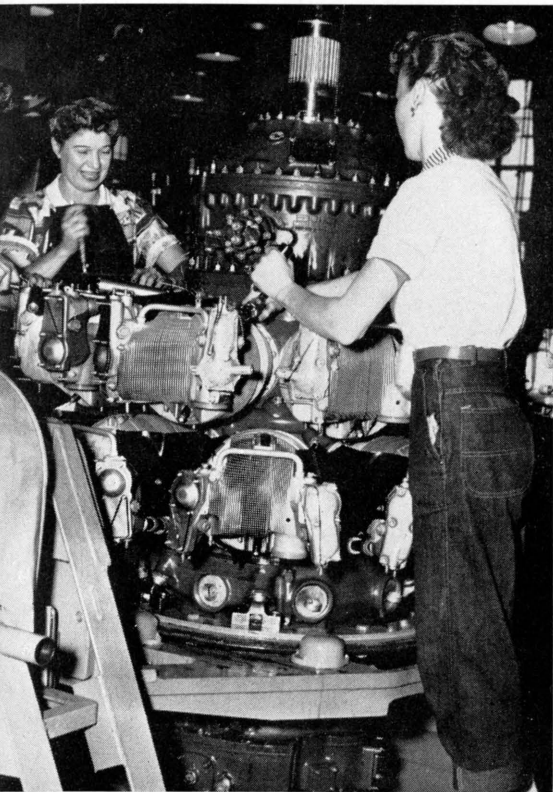
alone unless each year's crop of fish grows at a rate so uniform that the fish remain of an even size and grow rapidly enough to prevent confusion with other years' fish. The carp were collected at Ogden Bay Refuge because it is known that conditions for fast growth prevailed there. In most carp populations only the present year's crop can be recognized on the basis of size alone. Growth rates of earlier crops vary enough from one individual to another to cause a great deal of overlapping in size groups.

Carp at Ogden Bay Refuge were found to attain lengths of 7, 14, 20, 25, 27, 28, and 28½ inches for the first, second, third, fourth, fifth, sixth, and seventh years of life. It is apparent that the rapid growth occurs during the first 3 years and then the growth rate declines. Such rapid growth is probably not exceeded

*(Continued on page 23)*

**More than 300 pounds of protein taken in one haul of a seine at Bear River Migratory Bird Refuge**





# Working Mothers

## PRESSURES OF MODERN LIFE ARE INCREASING THEIR NUMBERS

By CARMEN FREDRICKSON



Hill Air Force Base is one of two bases in the Air Force where women employees are utilized for alert crews in the parking of aircraft

THE twentieth century is an era of exploration for women; perhaps as great for her as the seventeenth and eighteenth centuries were for man as he sought to find the secrets of the new world. The beginning of this century found woman still largely circumscribed by the age-old tradition that made her the guardian of the home with only limited experiences into man's world beyond her home premises. Even faster than men came to know the new world, women have entered quickly into the industrial and cultural world outside the home.

### Women Now in Industry

Each decade of this century has found more women working. In 1900 women

(Upper) Many women are now employed at Hill Air Force Base as aircraft mechanics

(Center) Women checking personal effects flexlines and doing other paper work connected with their division at the U. S. Naval Supply Depot

(Lower) Key punch operators at the Naval Supply Depot are usually women

workers numbered 5 million or 18 percent of the total working force. The entire labor force has somewhat more than doubled since 1900 while the women in it have more than tripled. In 1952 there was more than 19 million employed women workers or 31.3 percent of the total workers. Married women comprise a large labor reserve, which, particularly in time of crises, moves rapidly into employment. Many of women's family responsibilities have been taken over by other institutions such as the schools, the hospitals, the mortuaries, the playgrounds, the bakeries, and the grocery and department stores. Modern appliances and conveniences have also entered the home to lighten their work. With heavier pressures placed on the family to maintain increasing standards of living, it often

MRS. CARMEN FREDRICKSON is assistant professor of sociology and also Utah state president of the American Association of University Women. The study reported here is a phase of the large study of the effects of urbanization on Davis County.



takes more than one breadwinner. The mother finds herself being pulled and drawn into inviting work as well as pushed into it from pressing needs from within her family.

#### Reasons for Working

A study of working mothers in 203 families in Davis County confirms the presence in this area of urban trends that are also known to be operating elsewhere in America. The principal reasons for working given by the mothers in this study were:

1. *To supplement or increase the family income*, was given most frequently. This reason was named in 56.4 percent of all reasons given for working in Davis County between 1940 and 1950. Three-fourths (76 percent) of the mothers placed their earnings in the family till to be spent jointly with their husband's earnings. This harmonizes with a study by the Women's Bureau of the Department of Labor based on married women working in seven unions which showed 40 to 60 percent listing family support as a chief reason for working.

2. *To provide outside interests and contacts* was a reason in one out of four (26.5 percent) reasons given by working mothers. These mothers feel a strong need for more diversified contacts than the home itself provides. Mothers in the smaller households, of three and four, sensed this need more strongly than women in larger households. Where the family is small and modern homework lightened by electric conveniences, mothers feel a need for more varied social contacts than the home provides.

3. *To use skills and abilities previously acquired* was given as a reason for working in 10.6 percent of all reasons listed. Since only a minority of married women

have achieved significant skills this may be regarded as a strong motive for working by those who have skills.

4. *Various miscellaneous reasons* some of which have to do with crisis conditions, totaled 6.5 percent. They consisted of the war emergency, a shortage of teachers, children's education, poor health of husband, family business enterprise, and helping a neighbor. No doubt even other reasons are present, some of which the mother may not recognize herself.

#### Some Comparisons With the Country As a Whole

A Women's Bureau publication, "Facts on Women Workers", September 30, 1952, contains data on married, single, widowed, and divorced workers for 1944 (a war year) and 1951 as follows:

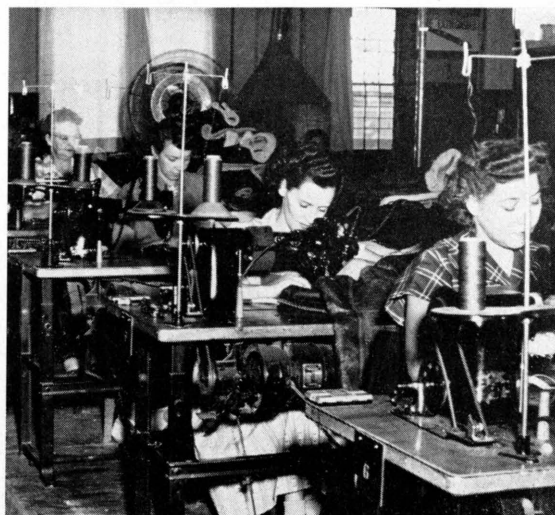
The labor force was made up of 35 percent women workers during this war year. This included 18,449,000 women workers. Although the actual number of women working in 1951 was greater than in 1944, the percentage was a little less. Fewer single women and girls worked in 1951 than in 1944, but the reverse was true for married women and widowed and divorced women with more working in 1951 than in 1944, both in percent and in number. Apparently contrary to the opinion of some persons, divorced and widowed women find it increasingly necessary to work for a living. In 1951 there were almost twice as many married women as single women in the labor force; however, about half the single women in the population were employed and about a fourth of the married women. Gains among women workers in 1951 and 1944 were made by married women and older women in age brackets 35 years and over.

(Continued on page 18)

(First below) Rows of sewing machines in the textile and rubber repair section at Hill Air Force Base are operated by women employees

(Second below) Women workers eat lunch together at the Naval Supply Depot

(All pictures used through courtesy of U. S. Naval Supply Depot, Clearfield, and Hill Air Force Base, Ogden)



(Left) A pleasing voice and manner are an asset in an office

(Second left) A tabulating machine operator checks the printing position of the form before starting the final report



# Cancer

## PROBLEMS RELATING TO ITS CAUSES AND CONTROL BEING APPROACHED FROM MANY ANGLES

By ELDON J. GARDNER

itself, much general basic information has been accumulated from the various research projects designed to study cancer. It is not too much to expect that the cancer problem will eventually be solved by the application of the scientific method.

The cancer problem may seem simple some day in the future when the secret has been learned, but now it is extremely complex. Cancer is different from germ diseases in its fundamental relationship with the cell. For this reason the experimental attack on cancer requires a different approach than that for most other diseases. Cancer is associated with uncontrolled growth. Several factors such as hormones, viruses, and chemical processes of living tissue are known to influence growth which is essentially a process of cell division. These are the fields which scientists must explore in their attempt to find an answer to the cancer problem.

Two fundamental problems which remain to be solved are: (1) what is the cause of abnormal growth or tumor formation?; and (2) why do tumors sometimes become fragmented and distributed (metastasized) to other parts of the body and there develop as secondary lesions? Any information obtained which will cast light on either of these two problems would have significance. The possible inheritance of abnormal growths or other predisposing factors for cancer is an important aspect of the problem. Since experimental animals as well as human beings have abnormal growth, they can be used effectively for the study.

### Abnormal Growths in Fruit Flies

Fruit flies represent an excellent laboratory material for genetic studies. They have a short life cycle requiring only ten days between generations and produce

large families in the order of 200 progeny per couple. They can be cultured easily in a laboratory where they seem quite happy to make their homes in milk bottles and feed on a cornmeal, molasses, yeast diet which is readily provided. Interestingly, fruit flies as well as higher animals have abnormal growths. Although they differ greatly from the higher animals, and their abnormal growths are undoubtedly different, they have cell division which is the fundamental process of growth. Knowledge of this important process in flies may be found applicable to other animals as well.

The particular strain of flies now being studied at the Utah Station was obtained from a wild population in Mexico. The flies were maintained and inbred under laboratory conditions for a year or two before the abnormal growths were observed on the heads of the adult flies. Presumably the abnormality arose following mutations of one or more genes which occurred while the flies were maintained in the laboratory. When the flies showing the abnormality were selected and mated together for a period of several generations, a stock was obtained in which about 75 percent of the flies were abnormal. The high percentage of abnormal flies has continued in this strain over a period of several years. Since the trait has not

*DR. GARDNER, professor of zoology, became a member of the Station staff less than a year ago. However, he has been engaged in cancer research for a number of years, both at USAC and at the University of Utah. The research reported here on fruit flies is supported by grants-in-aid from the American Cancer Society upon the recommendation of the Committee on Growth of the National Research Council and the Damon Runyon Memorial Fund for Cancer Research. The studies on the genetics of human cancer were conducted at the University of Utah and supported by a grant from the United States Public Health Service.*

Fig. 1. Abnormal growths on the heads of fruit flies

THE conquest of cancer is one of the most difficult research problems ever undertaken. Although large sums of money and much effort are now being expended, the fundamental process involved in cancer transmission and growth remains a mystery. In spite of the lack of immediate success on the problem

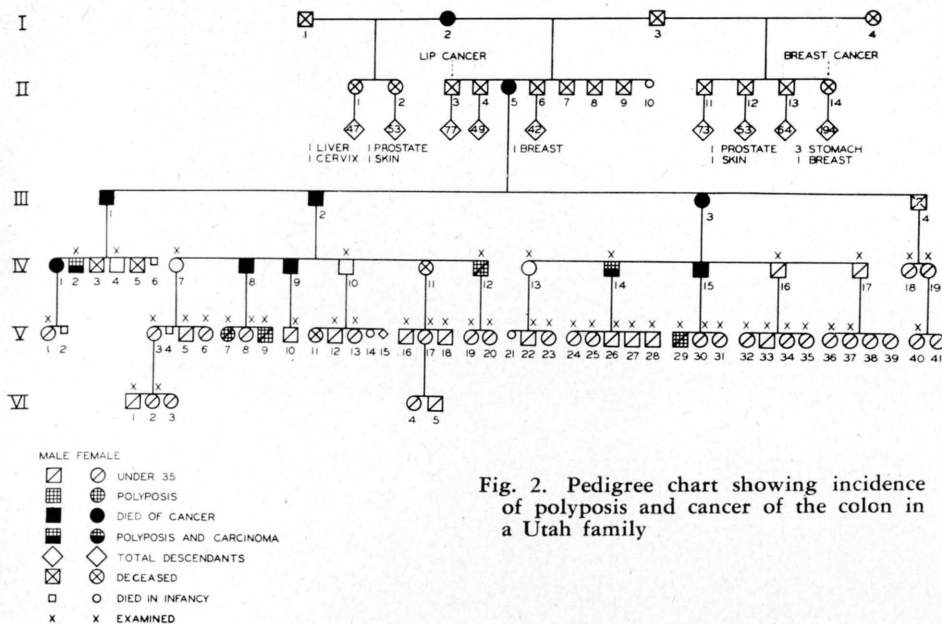


Fig. 2. Pedigree chart showing incidence of polyposis and cancer of the colon in a Utah family

appeared in other stocks the condition must be hereditary.

The first experiments were designed to determine which chromosomes were involved. Appropriate tests consisting of replacements of chromosomes from the tumorous head stock with marked chromosomes, showed that the first and the third chromosomes carried genes, both of which were required for the expression of the trait. Fruit flies have a total of four chromosomes, the second and fourth having little or nothing to do with this particular abnormality. The approximate locations of the genes in the chromosomes have been determined.

When flies from the tumorous head stock were crossed reciprocally with wild flies, different results were obtained in the first generation. Tumorous head females mated with wild males produced about 30 percent of abnormal flies in the first generation compared with one percent or less from the reciprocal cross between tumorous head males and wild females. In the second generation comparable results were obtained from the two crosses. One percent or less of the  $F_2$  progeny from both reciprocal crosses were abnormal. This difference resulting from reciprocal crosses in the first generation has been interpreted as a maternal effect. Evidently, some influence from the tumorous head mother on the egg or developing embryo is responsible for the higher percentage of abnormal growths in the progeny.

Investigation on the effects of temperature change on the incidence of abnormal growth showed that the growths were more frequent when the flies were raised in the higher temperatures. A gradual increase was observed from 54 percent of abnormal flies at 18° C. to 93 percent at 30° C. When the flies were introduced to the different temperatures at different intervals in their life history, it was shown that a temperature effective period existed during the first twenty-four hours of development. The flies were not influenced by temperature at any stage other than the first twenty-four hours of development, which represents the egg and early larval stage. The maternal effect controlled by the gene in the first chromosome was shown to be influenced by temperature at this period. The action of the other more basic gene in the third chromosome was not influenced by temperature change.

Flies from eight different wild populations in Utah were tested to determine what influence their genes might have on the production of the abnormal growths. Modifiers enhancing the incidence of abnormal growths were found in some flies representing each of the eight samples. The study of wild populations was then enlarged to include 25 more samples from localities widely distributed throughout the United States. Fifty flies from each sample were tested. Some representatives from each were shown when arranged in combination with the tumorous head genes to carry

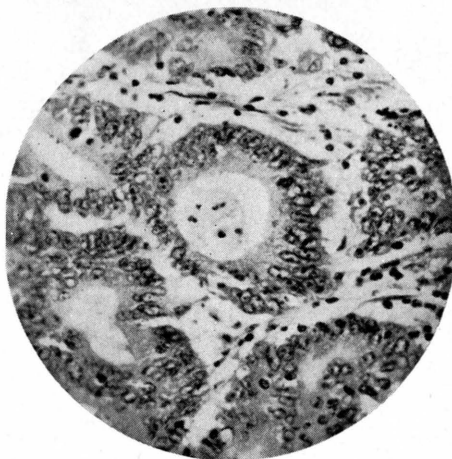
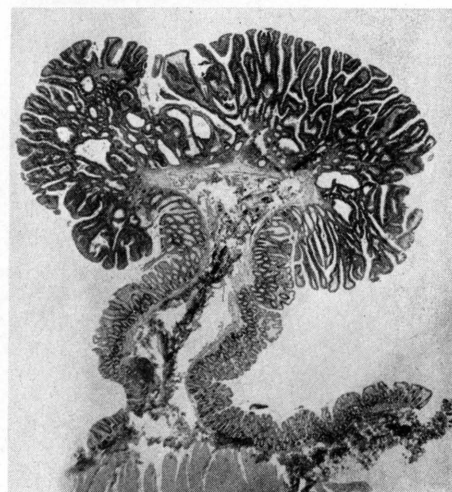


Fig. 3. (Upper) Intestinal polyps in surgically removed portions of colon of IV-2

Fig. 4. (Center) Longitudinal section of intestinal polyp of IV-14 showing connection with mucosa

Fig. 5. (Lower) High magnification of section of specimen from IV-2 showing early malignant stages

modifiers favoring the abnormal growths. The proportion of flies carrying modifiers ranged from a few to more than half of the individuals in some samples. In a

(Continued on page 20)





Fig. 1. Dry land infested with biscuitroot. The area in the foreground has been treated with 2,4-D in 1949 and again in 1950 and yielded 40 bushels of wheat to the acre in 1951. In the immediate background is an untreated plot which yielded 15 bushels of wheat an acre in 1951

## Biscuitroot Seriously Reduces Yield of Winter Wheat

By D. C. TINGEY

**B**ISCUITROOT, *Lomatium leptocarpum* (T. and G.) C. and R., has invaded large acreages of dry-farm land in northern Utah and southern Idaho. Farmers have estimated that about 10,000 acres of wheat land in northern Utah is infested with the weed. This weed, native to this area, is found on range lands from northwestern Colorado to northern Idaho, south to northern Arizona, and in northeastern California.

To most farmers in Cache Valley, biscuitroot is known as wild carrot, *Daucus carota*. Biscuitroot and wild carrot belong to the same family of plants. Biscuitroot is an early maturing perennial, reproducing by both seeds and roots. It has tuberous roots and frequently has two or more bulb-like corms attached in a series like a string of beads. The inside texture of a root is similar to that of a biscuit. Plants are from 12 to 18 inches tall, flower petals are yellow, and the seed resembles par-

*D. C. TINGEY is professor of agronomy. His research has been mostly in two areas, weed control and the breeding of disease resistant varieties of winter wheat.*

Biscuitroot, being a perennial, occupies the soil during both the fallow and crop year, and this is equivalent to growing a wheat crop each year. As a result the favorable effects of the fallow are destroyed. In addition, the weed competes with the crop during the crop year. This combination of effects results in a serious reduction in the yield of wheat.

Biscuitroot can be largely eliminated in 2 years with 2,4-D at the rate of 2 pounds acid equivalent per acre, with one treatment each year applied before the weed comes into bloom.

snips except they are smaller and narrower (fig. 3).

Wild carrot is a biennial and reproduces only by seed. The plant develops from a seed, and the first year it forms a rosette of leaves and a fleshy cone-shaped root. During the second year, leaves and flower stocks are produced from the fleshy root, they are 2 to 3 feet tall, the flower petals are white, and as the seeds, which resemble those of the garden carrot, mature, the plant dies.

### Biscuitroot is Most Common on Wet Land

Biscuitroot has become troublesome in winter wheat on the low bottom lands and on higher areas where the soils are heavy with poor internal drainage. These soils remain wet late in the season. Winter wheat is grown on much of the area in rotation either with fallow or alfalfa. Biscuitroot being an early maturing perennial, there is not much opportunity to control it on wet low lands by tillage methods during the fallow year. On some of the higher and drier ground, tillage could no doubt be used effectively. However, it would need to be started early in the spring soon after the plant emerges. Alfalfa does not offer much competition since the weed has nearly completed its growth before the first crop is cut and the land remains too wet to cultivate before the alfalfa gets so tall that tillage would cause damage.

Prior to the time the experiments reported here were started, some of the farmers in the Cove, Utah, area had used 2,4-D without success. The same unsatisfactory results occurred in the experimental tests from the treatments made the



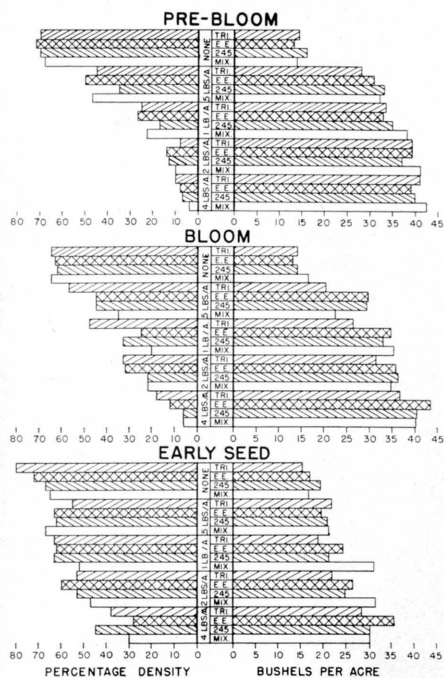


Fig. 2. Percentage density of biscuitroot in 1951 from treatments made in 1949 and 1950 and the acre yield of wheat in 1951 (Herbicides used were triethanolamine salt and ethyl ester of 2,4-D, isopropyl ester of 2,4,5-T, and a mixture of 75 percent ethyl ester of 2,4-D and 25 percent isopropyl ester of 2,4,5-T

first year. Reason for the failure was discovered to be the lateness of applying the herbicides. Biscuitroot increases in resistance as it comes into bloom. This early experience with 2,4-D by the farmers was unfortunate as it has made many skeptical of 2,4-D as a possible means of control. Consequently, only three or four farmers have been interested enough to initiate a chemical-control program to eradicate biscuitroot from their farms. Yet from the data available, biscuitroot appears greatly to reduce the yield of

winter wheat and causes considerable loss in income to farmers.

#### Experiment Started in 1949

A new area heavily infested with biscuitroot was selected for the second experiment which was started in 1949 at Cove on a farm adjoining the one where the first experiment was conducted. The second experiment consisted of using four herbicides applied at five rates and at three stages of growth of the weed, with three amounts of water used in applying the herbicide. These treatments were made in all combinations giving a total of 180 treatments. Results of the treatments made in 1949 on yield of wheat and the re-growth of biscuitroot in 1950 were reported in the June, 1950, issue of Farm and Home Science. Results of the 1949 experiment showed that treatments made before bloom and the higher rates of application were much more effective than similar treatments made at bloom or later stages, or at lower rates. Considering the increased yield of wheat and the cost of the chemical and of applying it, the best treatment gave a net return of \$8.12 an acre the first year.

#### Results of the Second Experiment After 2 Years' Treatment

The experimental plots started in 1949 received a repeat treatment in 1950, except the herbicides were all applied on the acid equivalent bases and the differential water treatments were discontinued and 20 gallons of water was used in applying the herbicide on all treatments. Reason for discontinuing the water treatments used during 1949 at the rates of 5, 20, and 80 gallon to the acre was that no differential effect in either increasing or decreasing the effectiveness of the chem-

ical on either weed control or on wheat yields was found.

In 1950, the land was fallowed so no yield data were available. Land was plowed in the spring while the soil was still moist and about two weeks after the herbicides were applied. Winter wheat was sown in the fall and a uniform stand of wheat obtained. In 1951 none of the plots received any additional herbicidal treatments. This was to avoid any likelihood of herbicidal damage to the crop since the primary objective was to determine the relationship between the density of biscuitroot and the yield of wheat. The percentage density of biscuitroot was estimated on all plots in the spring of 1951 after the biscuitroot came into early bloom on non-treated plots. This allowed ample time for the surviving plants on the treated plots to emerge. When the wheat was ripe, yield data were obtained. Density of biscuitroot and acre yields of wheat in 1952 for the various treatments are shown in the chart (fig. 2).

(Continued on page 21)





Kirk Lund, manager of the USAC turkey and poultry farms, is traying eggs from a case rather than the freshly gathered eggs in the basket. The trayed eggs will be placed in the incubators in the background

## Effect of Holding on Hatchability of Turkey Eggs

By ALFRED B. STEPHENSON

**H**OLDING turkey eggs for 2 weeks will decrease hatchability of fertile eggs about 25 percent below that of fresh eggs. At the Utah Station over a three-year period, hatchability decreased 2.11 percent for each day the eggs were held before setting (table 1). The daily decrease was greater in 1950 and 1952 when the eggs were held at lower temperatures. Research at Missouri has shown temperatures below 40 degrees F. and above 70 degrees F. cause a more rapid decline in hatchability of chicken eggs than temperatures between these extremes.

It is frequently necessary to hold hatching eggs at temperatures and for periods

of time which are known not to be the optimum for highest hatchability. The best temperature for holding hatching eggs is approximately 50 degrees F. and even at this temperature they should not be held more than 7 days. How much hatchability is decreased when eggs must be held at temperatures other than 50 degrees F. and for periods as long as 15 days is a question worthy of consideration.

The Utah State Agricultural College has never had a room with controlled temperature and humidity in which eggs

*DR. STEPHENSON is associate professor of poultry husbandry.*

could be held from time of laying until set in an incubator, so it has been impossible to maintain a 50 degrees F. temperature. The brooding and rearing facilities at the college turkey farm, and type of research being conducted with pedigree poults, make it impractical to set turkey eggs more often than every two weeks.

### Source of Information

At the poultry farm records are available on fertility and hatchability over a three-year period on each pedigreed egg incubated. It is difficult to distinguish infertility from early embryonic mortality, so most of the information reported here



is based on known fertile eggs rather than total eggs set. It may be misleading to include infertile eggs in a study of holding and incubating conditions since such eggs have no possibility of hatching under any holding or incubating conditions.

Turkey eggs were classified into 15 groups according to the number of days they were held before incubation. This classification was determined separately for each hatch, for each strain, and for the entire season. The decrease in hatchability from holding is shown in fig. 1, 2, and 3. In 1950 and 1952 (fig. 1 and 2), the temperature varied from 32 degrees F. up to near the maximum outside temperature before May. In 1951 the temperature of the egg holding room was between 60 and 68 degrees F. most of the time. The crooked lines in these figures connect the percentage values of eggs hatching in each age group. The heavy solid and broken lines show the average influence of holding when based on total eggs set and known fertile eggs.

#### Holding Time as Related to Season

The average change per day in hatchability caused by holding is not the same for the eggs set on February 17 as it is for eggs set on April 28. These differences can be seen in table 1. Referring to the upper-left portion of this table, the value -4.09 is found under the year 1950 and opposite February 17. This means that, on the average, for each day the eggs were held before setting on February 17, 1950, there was a decrease in hatchability of 4.09 percent. The day-to-day change

Table 1. Changes per day in hatchability when classified by season and by year

Approx. date of setting	Percent change in hatching for each day held Known fertile eggs			
	1950	1951	1952	All years
Feb. 17	-4.09	-1.99	-4.41	-4.33
March 3	-.78	-1.10	-3.60	-1.84
March 17	+.36	-1.81	-3.03	-1.48
March 31	-3.75	-2.67	.....	-3.36
Apr. 14	-3.96	-3.01	-1.59	-2.71
Apr. 28	-.27	-1.21	+.76	-.71
Entire season	-2.25	-1.98	-2.16	-2.11
Holding temp.	Above 32° F.	Above 60° F.	Above 32° F.	.....

may be more or less than -4.09 percent, but this value best expresses a uniform change from day to day. Actually the hatchability of eggs held 1 to 3 days was 70, 71, and 74 percent, respectively, while those held 12, 13, and 14 days were 40, 22, and 0 percent, respectively. For the eggs set on February 17, 1951 and 1952, there was a decrease of 1.99 and 4.41, respectively, in percent hatchability for each day held. Over the three-year period the average decrease was 4.33 percent.

In general, holding decreased hatchability most for the earlier hatches when the temperatures were cooler. This trend emphasizes the importance of maintaining the egg holding temperature well above the freezing point.

Recent research by the U. S. Department of Agriculture has shown that the optimum temperature for holding chicken eggs is 50 degrees F. If eggs are held for only one week, holding temperatures of 60, 70, and 40 degrees F. were progressively less desirable but failed to decrease hatchability more than 6 percent from the

optimum of 50 degrees F. However, holding eggs for 6 to 8 days at 30 degrees F. was harmful. Seventy-eight percent of the eggs held at optimum temperature hatched while only 3 percent of those at 30 degrees F. hatched. It was also found that when eggs were held more than 21 days, a holding temperature of 50 degrees F. was much better than one of 55 degrees F.

#### Strains Respond Similarly

There were no obvious differences among the eggs of the various strains of turkeys in their reaction to time of holding before incubation. The strains were compared on the basis of all eggs incubated over the three-year period. All showed a decrease in hatchability of known fertile eggs of approximately 2 percent for each day the eggs were held before incubation.

#### Do Not Set Eggs On The Same Day They Are Laid

The influence of time of holding on hatchability does not appear to be uni-

(Continued on page 23)

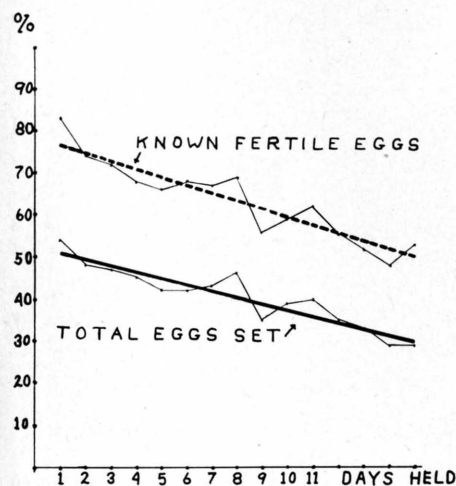


Fig. 1. Percent of eggs hatching normal poults in 1950 with holding temperature above 32° F.

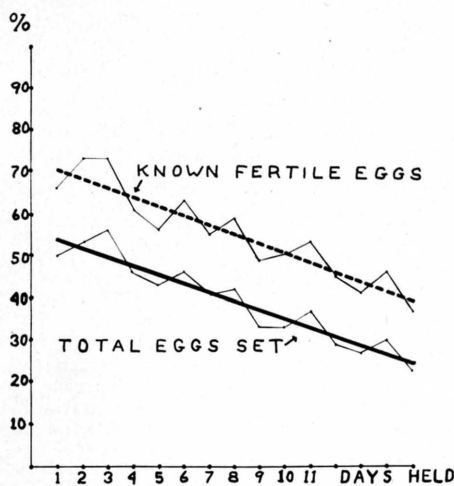


Fig. 2. Percent of eggs hatching normal poults in 1952 with holding temperature above 32° F.

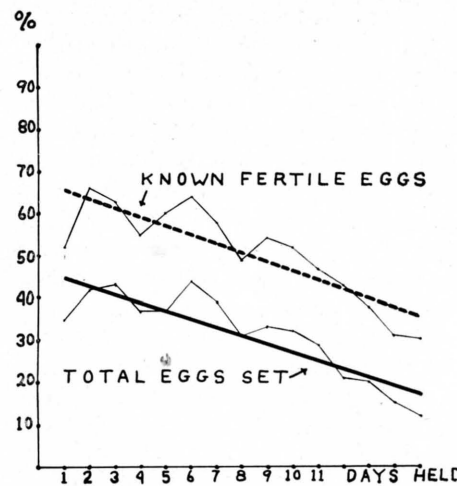


Fig. 3. Percent of eggs hatching normal poults in 1951 with holding temperature above 60° F.





When landscaping a home where chlorosis is a problem use of chlorosis-resistant shrubs will insure beauty, good growth, and long life of the planting



## SELECTING *Chlorosis Resistant* *Shrubs*

By D. W. THORNE and F. B. WANN

**C**HLOROSIS is the severe yellowing and often burning of plant leaves that occur on certain soils high in lime. Most fruit trees and berries and many shade trees, ornamental shrubs, and flowers are affected. The yellowing is caused by the unavailability to plants of iron in these soils. Soil and plant treatment for control is often difficult but can be achieved by the careful and persistent gardener. Most home owners who have severe chlorosis in their ornamentals will obtain most satisfactory results, however, by choosing plants that are adapted to high lime soils and are not seriously affected by chlorosis.

A field test of the relative resistance of various ornamental shrubs and shade trees was begun by the Utah Agricultural Experiment Station in the spring of 1950 at the request of the Associated Garden Clubs of Utah. The test has involved 32 different species of shrubs and 10 different species of trees. Five shrubs and three trees of each species were planted.

The experiments are being conducted on a plot of land in Logan where lime-induced chlorosis is so severe that most fruit trees will not survive more than two seasons unless given special treatments.

A brief report of the relative resistance of the various plants was made in the fall of 1950. After three years the tests will

probably be discontinued. There has been chlorosis among the different plants over some shifting in relative susceptibility to the three-year period.

Plant Common name	Plant Scientific name	Average chlorosis rating*			No. sur- vived† 1952
		1950	1951	1952	

<b>Most resistant</b>					
1. Tamarix	Tamarix hispida	0	.9	.5	5
2. Blue mist	Caryopteris sp.	.2	.1	.6	5
3. Honeysuckle, pink tatarian	Lonicera tatarica	.3	1.4	1.3	5
4. Honeysuckle	Lonicera sp.	3.0	3.0	1.9	5
5. Privet hedge	Ligustrum obtusifolium	2.4	3.0	2.0	5
6. Euonymus	Euonymus americana	.5	1.5	2.0	5
7. Mentor barberry	Berberis mentorensis	1.0	2.3	2.0	5
8. Pea tree	Caragana arborescens	3.0	3.8	2.2	5
9. Snowberry	Symphoricarpos racemosus	1.2	1.5	2.4	5
<b>Intermediate</b>					
10. Rose of Sharon	Hibiscus syriacus	2.2	3.2	2.7	3
11. Lilac hedging—new Chinese	Syringa chinensis	.2	1.9	2.8	3
12. Lilac, Hungarian	Syringa josikaea	.8	1.5	2.9	5
13. Beauty bush	Kolkwitzia amabilis	1.3	3.6	3.0	4
14. Symphoricarpos	Symphoricarpos chenaulti	1.4	2.5	3.1	5
15. Mock orange	Philadelphus virginialis	1.5	3.0	3.2	4
16. Red Siberian dogwood	Cornus sp.	1.1	3.4	3.2	3
17. Bridal wreath	Spiraea vanhouttei	1.3	3.5	3.2	5
18. Golden bells	Forsythia intermedia	2.0	3.5	3.2	4
19. Cranberry shrub	Viburnum trilobum	.4	2.3	3.5	2
20. Honeysuckle—gold flame	Lonicera sp.	2.8	4.3	3.6	4
<b>Most susceptible</b>					
21. Japanese scarlet	Cydonia japonica	2.2	4.3	4.0	5
22. False spirea	Sorbaria aitchisoni	4.0	5.0	4.2	4
23. Rhodotypos	Rhodotypos scandens	2.4	4.6	4.2	5
24. Red-leaved barberry	Berberis thunbergii	1.5	4.0	5.0	1
25. Rose acacia	Robinia hispida	3.2	4.4	....	0
26. Hansen's bush cherry		1.6	4.4	5.0	4
27. White flowering almond	Prunus triloba	3.5	5.0	5.0	1
28. Spirea	Spiraea frobeli	2.8	5.0	5.0	5
29. Bristol ruby	Weigela	3.0	5.0	5.0	1
30. Purple wisteria	Wisteria sinensis	2.3	5.0	5.0	1
31. Arrow wood	Viburnum dentatum	4.6	4.4	5.0	1

\* The ratings indicate the following conditions: 0—normal green color, 1—slight yellowing of leaves, 2—distinct yellowing of most leaves, 3—bright yellow color of leaves, 4—bright yellow color with severe burning of many leaves, 5—most leaves severely burnt, plant barely surviving.

† Number surviving out of 5 planted.

DR. THORNE is head of the Department of Agronomy and DR. WANN of the Department of Botany and Plant Pathology. Both these men have spent a major portion of their research time for many years on the study of chlorosis, its causes and control.

The trees showing best chlorosis resistance in the tests are green ash, Russian olive, and Siberian elm. Honey locust has been moderately chlorotic, but has made fairly good growth. Catalpa, silver maple, flowering acacia, flowering crab, london plane tree, and weeping willow have been highly chlorotic.

The shrubs were planted in rows five feet apart and five feet between the rows. Each plant was rated for degree of chlorosis in the first part of August and September of each year. The order of shrub names in the list is made according to increasing severity of chlorosis symptoms in the third year.

Shrubs most susceptible to chlorosis also tended to die most readily. Even though the winter of 1951-52 was severe and many plants were killed back to the

snow line, all plants in the most resistant group were living at the end of the third year. An average of 4 plants survived in the intermediate group, and losses were greater in the most susceptible group.

Caution must be used in applying these results to home plantings. In the first place there are many selections of most of the plant species in addition to the selections included in the test. Some may have different degrees of resistance to chlorosis than the selections used here. Also the tests are necessarily conducted on only one soil and management situation where chlorosis is a problem. Plants vary in their response to environment. Even though the ratings given here are subject to modification, they represent the only ratings we know about of chlorosis resistance of such plants based on actual ex-

periments. Consequently, the ratings should be helpful where experience in the use of any of these plants is not available. Furthermore, since some of the plants can be found in nearly every vicinity, these plants can be used to indicate how others in the list might fare.

#### Trees seriously affected by chlorosis

Orchard flowering acacia  
Catalpa  
Eastern red cedar  
Flowering crab  
Silver maple  
London plane tree  
Black walnut  
Weeping willow

#### Trees not seriously affected by chlorosis

Green ash  
Siberian elm  
Russian olive  
Honey locust (moderately chlorotic but grew well)

## BROILER PRODUCTION

(Continued from page 2)

important factor influencing success in raising broilers. The average feed conversion for all lots was 3.4 pounds. The third of the lots with highest net returns per pound required only 3.2 pounds of feed to produce a pound of broiler, while 3.8 pounds of feed were needed for lots showing the lowest net returns per pound. Feed conversion ranged from a low of 2.6 pounds to a high of 5.8 pounds on the 128 lots. When the feed conversion exceeded 3.4 pounds, the net returns were generally negative.

#### Size of Lot

The size of the lot affected the success of broiler growing. Within the scope of this study the maximum size of a broiler enterprise for profitable production was not encountered. Lots starting with an average of 7,143 birds showed net returns of 1.7 cents per pound but the point was not reached where net returns decreased as the size of the lot increased. The third of the lots with the highest net return per pound started an average of 4,422 birds per lot. The third of the lots with the lowest net returns only started 2,153 birds. Using average man-hours of labor as reported by the third of the lots with the highest net returns per pound of broiler raised, one man working 325 ten-hour days per year could handle 46,000 broilers or about 12,500 birds per seasonal lot, spring, summer, fall, and winter.

Table 2. Comparison of the third of broiler lots with highest net returns per pound, the third with lowest net returns per pound, and average of 128 lots, Utah, 1951-52

Item or factor	Unit	1/3 highest net returns per pound	1/3 lowest net returns per pound	Average all farms
Receipts per bird	cents	96	91	95
Cost per bird	cents	86	113	96
Net returns per bird	cents	10	-22	-1
Receipts per pound	cents	31.3	29.5	30.6
Cost per pound	cents	28.1	36.7	30.9
Net returns per pound	cents	3.2	-7.2	-0.3
Feed cost per pound of broiler raised	cents	17	21	18
Rate of gain per day	lbs.	.040	.036	.038
Hours of labor per 100 birds raised	hours	7	16	9.8
Average weight at sale	lbs.	3.1	3.1	3.1
Age at sale	days	78	86	82
Percent death loss*	percent	5.0	8.0	6.1
Pound of feed fed to produce a pound of broiler	lbs.	3.2	3.8	3.4
No. of chicks started per lot	no.	4422	2153	3266
Average fixed capital investment per bird	cents	39	62	43

\* Calculated on the basis of number of chicks paid for.

#### Low Death Loss

Success in broiler raising was associated with a low death loss. Increased mortality was accompanied by higher production costs and lower net returns. Mortality averaged 6.1 percent on all lots. The death loss calculated on the basis of the number of chicks paid for was 5.0 percent on the lots with the highest net returns per pound and 8.0 percent on the lots with the lowest net returns per pound.

#### Early and Rapid Development

Management practices that will produce early and rapid development of the

birds are highly desirable. The lots showing the highest net return per pound gained .04 pound per day and were marketed in 78 days at 3.1 pounds. The average for all lots was .038 pounds gain per day, and the birds were sold in 82 days at 3.1 pounds.

#### Estimating Cost of Production

By use of the average amounts of inputs as developed from this study of 128 lots, a method of estimating the total cost per pound of producing broilers under changing levels and relationship of input



expenses can be formulated. Ninety-one percent of the costs of producing broilers consisted of feed, chicks, and labor. Therefore, any changes in the prices of these items may give an indication of cost trends in broiler production.

In estimating total production costs multiply 3.4, the average pounds of feed required to produce a pound of broiler, by the average estimated price per pound of broiler feed. Second, multiply .032, the average hours of labor required per pound of broiler, by the average current hourly wage. Third, multiply .34, an adjustment factor to reduce the cost per chick to the cost per pound of broiler, by the current cost per chick. This adjusted figure, .34, is calculated by multiplying 3.1, the average weight of the bird at sale, by 93.9, the average percent produced of the total birds started, and dividing this total into 1 cent. Finally, add the totals resulting from the three operations above, divide by 91 percent, and multiply by 100 to adjust the costs for the remaining 9 percent of the costs which were miscellaneous.

If at the beginning of a seasonal lot a producer could estimate the cost of feed during the production period to be \$5.00 per hundredweight, the cost of labor at

\$1.00 per hour, and could buy chicks for 16 cents each, then he could estimate his total cost of production to be 28.17 cents per pound as follows:

$$3.4 \times \$0.05 \text{ per pound} = 17.00 \text{ cents for feed}$$

$$.032 \times \$1.00 \text{ per hour} = 3.20 \text{ cents for labor}$$

$$.34 \times \$1.16 = \frac{5.44 \text{ cents for chicks}}{25.64 \text{ cents per pound for 91 percent of cost items}}$$

$$\frac{25.64 \text{ cents}}{91 \text{ percent}} \times 100 = 28.17 \text{ cents per pound of broiler produced}$$

#### Future Expansion

The future expansion of the broiler enterprise in Utah will depend on its profitability as a farm enterprise. For greatest success it may be that greater specialization will be necessary where larger lots, good labor and capital efficiency, and specialized production practices can be had. Better feeding efficiency would offer a possibility for greater profits since feed constitutes about 60 percent of the total costs, and improvement here might come through better feeds, better chicks, and wider adoption of better management practices.

Consumption per capita of broilers in the nation is estimated to be 15 pounds, which the industry feels is way short of what should be expected. It is estimated that per capita consumption of chicken including broilers in the Western States is only two thirds to three fourths as high as the United States average. Therefore, increased consumption of broilers through advertising, the availability of broilers on a year-round basis in fresh non-frozen or quick-frozen form, and other methods afford opportunities to increase consumption and expand the production of broilers in Utah. This state compares favorably with other states in broiler production. While there are no data available strictly comparable to those reported here, indication from studies in other areas is that Utah producers seem not to be at any particular disadvantage compared to producers in other areas. Utah has achieved certain advantages in cost and other factors which may assist the broiler industry in its competition with other areas in the development of the new market outlets. The feasibility of developing out-of-state markets to any marked degree needs further study. The production end of the broiler industry seems favorable.

## WORKING MOTHERS

(Continued from page 9)

### Opportunities For Work Are Close at Hand

Davis County has three large defense plants employing workers from that and neighboring counties. The proportion of women to men workers during a war year (1944) is shown at two of the plants in table 2. The third, the Ogden Arsenal, did not have figures available which listed men and women separately but an estimate of the civilian personnel officer and chief of the management office discloses about 60 percent of the 5,800 total employees were women in 1944. These three large work plants within the county used women almost as extensively as men.

More than a third of the mothers in the sample interviewed were working in 1950. Of the 203 families interviewed, 70 mothers (34.5 percent) were employed in 1950. This included those working full-time or part-time any time during the year. Thirty-two (15.8 percent) were

Table 1. Labor force participation of women by marital status, April 1951 and 1944 (civilians 14 years of age and over)

Marital status	In labor force			
	Number of women		Percent of women	
	1951	1944	1951	1944
	<i>thousands</i>		<i>population</i>	
Total	18,602	18,449	32.4	35.0
Single	5,430	7,542	49.6	58.6
Married	10,182	8,433	26.7	25.6
Widowed and divorced	2,990	2,474	36.1	35.7

Table 2. Number employed at war industries in Davis County 1944

Defense plant	Number employed		Percentage women employed
	Men	Women	
Hill Air Force Base	5,456	4,956	47.6
Naval Supply Depot	2,338	1,493	39.6
Total	7,794	6,449	45.3

working at full-time employment and thirty-eight (18.7 percent) were doing part-time work. In contrast to the 70 mothers who were working in 1950, only

21 were employed in 1940, 11 (5.4 percent) full-time and 11 part-time. The number of mothers employed in Davis County thus shows quite a steady trend

upwards between 1940 and 1950. This is in harmony with the national trend.

Full-time employment for mothers increased steadily from 1940 to 1946 and declined only slightly from 1946 to 1950. The three highest years of full-time employment in order were: 1946, 1947, and 1945 (18.2, 16.7, and 16.3 percent). Further detail on trends on part-time and full-time employment of women between 1940 and 1950 may be seen in table 3.

#### Size of Family Smaller Among Working Mothers

Davis County households are large, following the rural pattern of large families rather than the urban with its smaller families. This holds in the census returns of the total county and also for the sample group. In 1950 Davis County households averaged 3.81 members, Utah households 3.58, Utah urban 3.43, Utah rural non-farm 3.76, and Utah rural farm 4.22. The average household for the sample group was 5.4. Family responsibilities and children obviously influence the employment of mothers since the households for 1950 were largest for those unemployed (5.5) and those employed part-time (5.6) and was smallest for those employed full-time (4.7).

#### Changing Household Practices Show Urbanization Influences

The extent to which women in taking on outside employment were able to retain or cling on to responsibilities which they had earlier acquired within the home was observed. Changes in five home practices (canning, baking, sewing, mending, and visiting neighbors) between 1940 and 1950 were noted. The question was asked for each practice: has it increased, continued about the same, decreased, or never been done during the period? Canning fruit and vegetables, and baking bread and pastries are more than holding their own. They were practiced in 99 percent of the homes. Between 1940-1950, home canning has either increased or held its own in 87.9 percent of the homes covered. Home baking increased in 36.2 percent of the homes and continued about the same in 44.3 percent. Family mending is still important, being practiced in all of the homes and family sewing in 96.9 percent. These practices in the county remained about the same between 1940 and 1950. Eight percent of the sample mothers never visited neigh-

Table 3. Mothers with full-time and part-time employment by years, 1940-1950, Davis County, Utah

Year	Total group		Full-time work		Part-time work	
	number	percent	number	percent	number	percent
1950	70	34.5	32	15.8	38	18.7
1949	56	27.6	29	14.3	27	13.3
1948	52	25.6	27	13.3	25	12.3
1947	53	26.1	34	16.7	19	9.4
1946	54	26.6	27	18.2	17	8.4
1945	49	24.2	33	16.3	16	7.9
1944	45	22.2	27	13.3	18	8.9
1943	37	18.2	23	11.3	14	6.9
1942	33	16.3	17	8.4	16	7.9
1941	25	12.3	13	6.4	12	5.9
1940	22	10.8	11	5.4	11	5.4
Total working	111		68		58	

Table 4. Change in selected home practices between 1940 and 1950 by the mothers in Davis County who were working and those who were not working in 1950

Home practices	Percentage change in practice							
	Mothers working in 1950				Mothers not working in 1950			
	In-creased	Con- tinues about same	De- creased	Never been done	In- creased	Con- tinues about same	De- creased	Never been done
Canning fruit and vegetables	30.4	58.0	11.6	0	49.2	38.5	10.8	1.5
Baking bread and pastries	27.5	55.1	17.4	0	40.8	38.5	19.2	1.5
Family sewing	23.2	34.8	36.2	5.8	31.5	35.4	30.0	3.1
Family mending	17.2	52.2	30.4	0	33.8	46.9	19.2	0
Visiting neighbors	8.7	36.3	42.0	13.0	14.6	55.4	24.6	5.4
Average percentage	21.5	47.2	27.5	3.8	34.0	42.9	20.8	2.3

bors as a practice. Nearly half (48.7 percent) have continued the practice without change, while 30.7 percent do less of it. A few (12.6 percent) do more of it.

Statistical analysis of the difference in use of five practices in table 4, between women working in 1950 as contrasted with women not working showed a significant difference between the two groups of mothers in the practices of canning fruit and vegetables, in family mending, and in visiting neighbors. Working mothers have been forced to diminish their activities in these practices. Where the total group has more than held its own, working mothers have not been able to do so. There was thus a sacrifice in two customary and traditionally useful home practices where the mothers were working, and also in the socially customary friendly practice of visiting neighbors.

Baking bread and pastries and sewing at home showed less difference between working and non-working mothers. In these areas mothers working continued with the practices probably because of family need. Since family baking increased for the group as a whole, it appears that working mothers continued

their baking practice successfully in spite of working. For sewing they were nearly able to hold their own.

Although increasing divorce and other evidences of family disintegration characterize the urban processes, this study indicates, on the whole, that married women who work in Davis County are making a real effort to keep up with home responsibilities. Such effort and such sacrifices cannot help but contribute strength to family solidarity for which the sacrifices are made.

In view of the fact that the three large war plants have employed practically as many women as men during much of their history, the increase in family income from women's working must have been considerable. Since more of her money went into the family till, women's motivations in these expanded activities have obviously been of the highest quality. Their decreased activity in specific home responsibilities such as canning fruit and vegetables and family mending appears to have been of minor proportions. Mothers have clung steadfastly to their older duties as they have taken on new ones.



## CANCER

(Continued from page 11)

study of the influence of abnormal growth on viability, tumorous head flies were shown to be about 20 percent less viable than the wild flies used as controls. A maternal effect on viability as well as on the expression of abnormal growths was detected from the results of reciprocal crosses.

The study is now being continued with the specific objectives of analyzing the maternal effect, testing the influence of amino acids and other chemicals supplied in the diet on the development of the tumors, and analyzing the fundamental nature of the abnormal growths and their hereditary tendency. Information concerning the first problem, that of the nature and inheritance of abnormal growths, may be obtained from the successful conclusion of the studies.

### Experimental Studies on Mice

Since fruit flies are different from higher animals and probably do not have malignancy of the same type as that found in higher forms, it is necessary to approach the second question of why tumors sometimes become metastasized from animals more closely related to human beings. Mice have been widely used in different laboratories throughout the world for cancer research. Some twenty-five years ago the pattern of inheritance in mice appeared much the same as that among human beings at the present time. Sporadic cases occurred in different strains of mice but no patterns suggesting hereditary tendencies were obvious. Through close inbreeding over a period of 25 years through which 100 or more generations were produced, patterns of susceptibility to various types of neoplasia were discovered (table 1). Some strains following selection were shown to have a high incidence of mammary cancer, others a high incidence of stomach cancer, or lung cancer, and still others were high in leukemia. Some strains resulting from long selection showed a low incidence of all types. These studies indicate a genetic disposition based on numerous quantitative genes or polygenes. Evidently, no single dominant or recessive gene is responsible for the common types of cancer in mice, but rather, numerous genes are involved with cumulative effects.

Table 1. Tumor incidence in inbred strains of mice

Strain	Mammary tumor	Lung tumor	Leukemia
	percent	percent	percent
A	70-85	80-90	Low
C <sub>3</sub> H	75-100	5-10	Low
dba	55-75	Low	30-40
C57Bl.	Low	Low	Low
C57lead.	Low	71	Low
C58	Low	Low	90
Ak	Low	Low	60-80

The studies on mice have shown that many factors other than heredity must also be considered. The identity of these along with their mode of action has been the object of many experimental studies. In some types of cancer in mice genetics has been shown to play a major role, while in other types it is secondary or of no significance whatever. Investigations on mice also indicate that a malignant condition can occur at a specific site in a laboratory animal as a result of a genetic mechanism, while the same malignancy can occur in another animal apparently as a result of non-genetic factors.

Five factors known to influence the incidence of cancer in mice are: (1) genetics, (2) milk factor (a virus), (3) hormones, (4) carcinogens, and (5) irradiation. The order of importance of these five factors may vary widely according to the strain of mice, type of cancer, and environmental conditions. Studies of inbreeding indicate that genetics should be near the top of the list of general factors. The milk factor was identified a few years ago as a virus transmitted from the mother to the progeny through the milk. This factor has been found recently in other body fluids, such as saliva and semen. It is now considered less specific than it was previously described and it may be transmitted by the father as well as the mother. Hormones have been shown to be important growth regulating agents. Extensive studies in mice have indicated that the speed with which abnormal growth and cancer of certain types develop depends largely on hormones. Recently therapeutic measures in human beings as well as mice have resulted from successful regulation of hormones. Cancer of the breast and prostate can be temporarily treated by re-

moving certain glands and thus decreasing the hormones released in the blood. Carcinogens such as tar products have also been shown to induce cancer in places where they come in contact with body tissues. Finally, irradiation, one of the agents used for treatment, is known to induce cancer in mice and in human beings.

### The Inheritance of Cancer in Man

The heterogeneity of the human race as well as its characteristic of being exposed to diverse environmental conditions makes the study of genetics of human cancer a difficult task. Genetic analyses which are difficult even when using homogenic strains of mice, living in controlled environments, are infinitely more arduous and uncertain when undertaken in human beings. However, there is no question that heredity plays an important role in the predisposition of some types of human cancer. The medical literature contains records of several of these types. Multiple polyps growing inside the colon (Polyposis intestini), nodules developing in the connective tissue around the nerves (neurofibromatosis), pigment patches which become malignant (xeroderma pigmentosum), and tumor of the eye (retinoblastoma) are a few of the precancerous diseases which have been established as having an inherited tendency.

At the present time a number of research centers are actively engaged in investigations on the genetics of human cancer. Some of the objects are: (1) to distinguish if possible those types of cancer which have an hereditary basis from those resulting from non-genetic factors, (2) to determine the manner of inheritance of the former groups, and (3) to integrate the accumulated knowledge to a conscientious cancer-control program. Types of research are varied in different laboratories, but they usually include statistical, family history, and twin studies. The Laboratory of Human Genetics at the University of Utah, is carrying on studies in the genetics of human cancer. The general trend of these studies shows no conclusive evidence for inheritance of cancer in general but indicates that specific types of cancer have a familial tendency. Statistical studies at this

laboratory have shown that the incidence of gastric carcinoma is significantly greater among the relatives of the original patient with gastric cancer than in the general population, or among the relatives of controls. Likewise, breast cancer is more frequent in the families of breast cancer patients than among the controls. Another study from an eastern institution has yielded comparable results for cancer of the uterus. All three of these major types of cancer seem to occur two to three times more frequently among the relatives of patients with the particular kind of cancer than among the controls. This is not a striking heredity tendency and suggests that although heredity is involved, other factors are more important. The slightly increased incidence of specific types among the relatives of patients with those types may suggest the advisability of a careful watch for early symptoms in suspected areas.

Some other less frequent types of cancer follow hereditary predisposing factors. Cancer of the colon following polyposis intestini, for example, follows the pattern of dominant inheritance in some family groups. One family in which this condition is present came to the attention of the author through a student who had observed that several related individuals had died from carcinoma of the lower digestive tract. In one branch (fig. 2) of the kindred including 69 descendants of one couple, 8 deaths have resulted from carcinoma of the colon and rectum. One case of colon polyposis was diagnosed in the group while the family history study was in progress. This confirmed case led to the suspicion that familial polyposis was the predisposing factor for carcinoma, and a project was designed to see if polyposis could be detected in the living members. From a total of 51 living individuals, 6 were found to have polyposis, 39 were negative, and 6 young children were not examined. Pathological studies (figs. 3, 4, 5) showed that two of the six positive cases had already become cancerous. The range in age of the six positive cases was from 14 to 45 years. On the basis of the family history and the dominant mode of inheritance, predictions were made as to which individuals might be expected to inherit polyposis. It will be observed from the pedigree chart (fig. 2) that in every sibship where either polyposis or carcinoma was found to be

present, one parent has died from carcinoma of the rectum or colon and presumably has had polyposis. Whenever a parent had the abnormality the trait occurred in about half of his children, while all of the children of those parents not affected were normal. Since in each case a person with polyposis married a normal person all of the matings which have occurred in the family were between heterozygous (Pp) and homozygous recessive (pp) individuals. The dominant gene (P) for polyposis was thus segregated to half of the offspring. In view of the hereditary pattern for polyposis, well established from this study and others in the literature, and the fact that polyps predispose to carcinoma, a family history study would seem well justified for every case which comes to the attention of a physician. In the family group cited, treatment was sought too late by the eight individuals now deceased from cancer of the colon and rectum. Several of these were treated surgically for advanced cases of carcinoma, but none survived beyond a year or so and the cause of death in all cases was carcinoma. The hope for this family group and other similar groups in the future is that they will be alert to the danger and their family doctors will not brush the matter aside but will diagnose and treat the condition in good time.

## BISCUITROOT

(Continued from page 13)

### Effect of Treatments on Eradication of Biscuitroot

Rate of application and stage of growth when the herbicide was applied and herbicides used all show differential effects on eradication of biscuitroot (fig. 2). Heavier rates and earlier treatments gave the greatest reduction in biscuitroot. Even though there were differences among the herbicides, they were relatively minor.

The mixture of 2,4-D and 2,4,5-T, and 2,4,5-T alone seemed to be slightly more effective in reducing density. These two treatments are also the most expensive.

Considering the relative cost of the herbicides and the likelihood of damage to the crops, the triethanolamine salt of 2,4-D is preferred over any of the other materials. The data in the chart show



Fig. 3. Biscuitroot, *Lomatium leptocarpum*

the importance of making the applications before the plant blooms, and if treated at this time, the two-pound rate is the most economical amount to use.

### Effect of Density of Biscuitroot on Yield of Wheat

Yield of wheat was inversely proportional to the density of biscuitroot. The lower the density, the higher the yield of wheat.

It may be observed in the chart that where no herbicide was applied and the



density of biscuitroot was about 70 percent, the wheat yielded only about 15 bushels to the acre, and where the biscuitroot had been reduced by herbicidal treatments to 10 percent in density or lower, the wheat yielded about 40 bushels to the acre. This is a difference of about 25 bushels an acre. At the price of wheat in 1951, this 25-bushel difference represented an increased return of \$46.50 per acre. On a farm scale the cost of the recommended herbicidal treatment should not exceed \$6.00 per acre for the 2 years.

Probably the reason that biscuitroot has such a serious effect on the yield of winter wheat is the fact that it is a perennial and occupies the land during the fallow as well as the crop year, which is comparable to growing a crop of wheat each year. Consequently, the favorable effects that should come from the fallow on dry-land wheat is neutralized by the biscuitroot. Furthermore, though probably less important, there is the weed competition with the wheat during the crop year. The combination of the two conditions makes biscuitroot the number-one weed enemy of dry-land wheat. Farmers who have land infested with this weed would do well to initiate a program this spring to eradicate this pest as the increased yields of wheat the first year after the biscuitroot is eradicated will more than pay the cost of eradication.

## KELLY REPORT

*(Continued from page 4)*

ing, his employment is an economical investment in any field of research.

### Station Program

The program of the Utah station appears well proportioned to the needs of the major agricultural enterprises of the state. No experiment station can hope to be in a position to try to solve all the problems of agriculture in its state. Its responsibility is to study the changing needs and to direct its research, as effectively as its resources and manpower permit, toward the solution of unsolved problems of major importance to the state and toward increased efficiency in production and marketing of its major farm products. Attention must also be given to the needs of specialized producers who may be few in number but whose

problems are often as acute or even more acute than those of the producers of long-established crops or livestock. The station must also discharge its legal responsibility for conducting sociological and other studies for the benefit of the rural home and the improvement of rural life. The current problem of the station gives evidence that the administration and staff have discharged these responsibilities creditably.

### Research Failures

It must be recognized that as large a research program as that of an agricultural experiment station will inevitably involve some disappointments. Now and then the solution of a problem defies the best scientific efforts. Industry is said to be satisfied if 10 percent of the funds it devotes to research produces results that will pay off in the end. The editor of a well-known farm journal recently bemoaned the low proportion of failures reported in agricultural research. He implied that this showed a lack of willingness to tackle problems that promise to be difficult of solution because of the fear of criticism in the event of failure. Many tough problems of agriculture will doubtless remain unsolved until experiment stations venture to attack them in spite of possibilities that success may be long delayed or difficult.

## IRRIGATION WATERS AND SOILS

*(Continued from page 3)*

salty waters. However, it is known that lime is more soluble in waters containing sodium salts, particularly sodium sulfate, than in low salt waters. Also, there is a need for applying more water to soils where salty water is used than where the water contains only small amounts of salt.

The greatest danger of increasing lime in soil occurs with the use of waters fairly low or moderate in salt content. These are waters usually considered quite satisfactory for safe use. In disagreement with the concepts of some scientists no relation was found between the carbonate and bicarbonate content of the waters and lime accumulation in soil. The trends in lime accumulation represent no general threat to agriculture but where the accumulation

is continued for long periods certain plants such as fruit trees, berries, and ornamentals may be injured.

The results indicate that most soil changes resulting from irrigation with waters of different salt content can be anticipated from an analysis of the water and a classification of the quality of the water such as that listed in Utah Agr. Exp. Sta. Bul. 346. Since we now know the composition of most irrigation waters of the state, and since this study has indicated the conditions under which soils are being injured, we can predict the problem areas and can advise farmers how much of the trouble from salts in irrigation waters can be either prevented or reduced.

When the salt content of water is high, excess water must be applied periodically to leach out excess salt accumulations. High sodium waters should be avoided where possible, but when they are used, soils should be kept fairly moist during the irrigation season and occasionally leached with excess water.

## SPRING GRAINS

*(Continued from page 5)*

### Renew Seed Stock

Periodically every farmer should renew his seed source with certified stocks of recommended varieties. One should not discard a recommended variety in years when yields are low, because yields of the old varieties would likely be still worse.

### Lower Planting Rates

Where good seed is being used, experiments at Logan and in other states indicate that a somewhat lower planting rate can be used without loss in yield. Reductions from 10 to 20 percent of most of the new varieties can generally be made.

### Early Planting

Experimental results unanimously have shown early planting to be decidedly more profitable for wheat, oats, and barley. In a 1952 experiment the difference in favor of seeding April 28 over May 26 was 21 percent for Bonneville, 30 percent for Lemhi, 34 percent for Overland, and 20 percent for Velvon. Similar results have been found in other years.

By proper crop rotation, fertilization of soil, early seeding, use of recommended varieties, proper cultural methods, and irrigation, Utah crop yields could be

greatly increased. Much progress has already been made as shown by the fact that Utah ranks second highest in the nation for average yields of barley and ranks high in yields of other grain.

## AGING CARP

(Continued from page 7)

anywhere else in the state, although it may be equalled at some other waterfowl refuge. Ogden Bay Refuge is an ideal habitat for carp because of the large quantities of irrigation water and municipal sewage reaching the artificial impoundments there. The bottom of all the waterways and impoundments is covered with a rich layer of muck that is highly productive of aquatic insect larvae. Large numbers of midge larva are present, and these apparently are the main item of the carp's diet at certain times of the year.

### Age Composition of Population

While the evidence on hand is sufficient to warrant confidence in the gill cover method, more evidence will be sought in future years further to validate the method. With data on the age composition of a population of carp, it is possible for a fishery manager to predict the percent of a year's catch of carp that will reach a certain age and what size they will attain. It is also possible to decide whether a population of carp is being over or underexploited thereby placing carp production on a basis as sound as other types of animal production.

## HOLDING TURKEY EGGS

(Continued from page 15)

form (fig. 1 and 2). During 1950 and 1952, the eggs were held at a lower temperature than in 1951 (fig 3). Holding at the lower temperatures indicates that turkey eggs held 2 days before incubation hatched better than those held only one day. The Missouri Station found that chicken eggs held for at least one day at optimum temperatures hatched better than eggs set the same day they were laid.

The fact that the freshest eggs are not always the best seems strange at first to some people. However, similar conditions

are found with eggs used for other purposes. Research at Iowa State College on the age of eggs used in making angel food cakes showed that aging of eggs is not always harmful. The largest cakes were made from eggs less than one day old. The volume of cake decreased rapidly when the eggs used increased in age up to 3 or 4 days. However, from the third to the ninth day, aging of the eggs increased the volume of the cakes. During the period from 3 to 9 days the older eggs made the larger cakes. After 9 days there was a gradual decline in cake volume as older eggs were used.

## NEW PUBLICATIONS

**Bul. 357. Biennial report of the Utah Agricultural Experiment Station, 1950-1952.** R. H. Walker, director, Dee A. Broadbent, acting director. 64 p.

This is a statistical report covering the results of research, the organization of the station, the location of the research, list of research projects and cooperative agreements, the service activities, publications, personnel changes, the staff, and the financial report.

**Bul. 358. The rainbow trout in relation to the other fish in Fish Lake,** by W. F. Sigler. Department of Wildlife Management. 26 p.

This bulletin reports studies on the rainbow trout in Fish Lake started in 1922. These include food habits, population change, and fish size. Recommendations are made on management practices.

**Bul. 359. Broiler production in Utah, an economic analysis,** by E. M. Morrison and T. I. Gunn. Department of Agricultural Economics. 32 p.

A study made during 1951-52 of 128 lots of broilers showed that broiler production was a side line for persons who generally had another major source of employment. The study of the industry included production costs, receipts, mortality, feed consumption, labor requirements, and factors making for success.

**Bul. 360. The effects of fertilizer and moisture on the growth and yield of sweet corn,** by H. B. Peterson and J. C. Ballard. Departments of Agronomy and Vegetable Crops.

This bulletin gives data to show that highest yields of canning corn are produced with high levels of both moisture and nitrogen fertilizer. High nitrogen and moist soil are also conducive to early maturity and large full ears.

**Cir. 132. Selecting and using fertilizers,** by H. B. Peterson, R. F. Nielson, and J. P. Thorne. Department of Agronomy in cooperation with the U. S. Soil Conservation Service. 24 p.

This circular contains general recommendations on fertilizer needs of various soils and crops, the best types to buy, amounts to use, and how to apply them.

**Spec. Rep. 7. An economic analysis of the agricultural potentials of the Weber Basin Reclamation Project, Utah,** by W. U. Fuhrman, G. T. Blanch, and C. E. Stewart. Department of Agricultural Economics in cooperation with the U. S. Bureau of Agricultural Economics. 39 p.

This report describes the farm organization and the farm economy likely to develop if water under the Weber Basin Reclamation Project is made available and estimates the probable return to water and capital from applying water to the land.

**Spec. Rep. 8. Consumptive water use and requirements in the Colorado River area of Utah,** by W. C. Barrett and C. H. Milligan. Department of Irrigation and Drainage in cooperation with the U. S. Soil Conservation Service and the Utah State Engineer.

This study was made to provide accurate and reliable information on the consumptive use of water in the Colorado River area of Utah for the arbitration of the division of waters among the various states in the Upper Basin of the Colorado.

Single copies of any of these publications may be obtained free from the Utah Agricultural Experiment Station, Logan.

The best meat, like the best eggs, is not always the freshest. Meat cooked while rigor mortis exists is not as good as if it had been held long enough for this condition to pass.

A 50 degrees F. egg storage room will be available at the poultry farm for the 1953 hatching season. Data will be obtained on the influence of hatchability on time of holding at 50 degrees F. A comparison of 1953 with 1950-52 will provide data to determine the hatchability of eggs held under a good and bad holding environment.





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# Miracle Wheats A Delusion

At least once or twice a year some promoter claims he has a wonder or miracle wheat. Fantastic claims are made for these wheats and exorbitant prices obtained for small quantities of seed. Each time these new wheats turn out to be either Polish or poulard, whether the promoter claims they were found in an Indian mound or kiva, or came from the tombs of some Egyptian queen.

In all such cases farmers are told of the outstanding qualities of the new wheat, its larger kernel, its stiff straw, and the number of kernels per plant. Before their claims can be checked the fraudulent promoters have disappeared to commence their game in other quarters.

Claims of a miracle wheat have been made over a period of many years, especially in the western United States, as shown in an article written in 1923 by Dr. John H. Martin, of the Bureau of Plant Industry, and published in the U. S. Department of Agriculture Farmers' Bulletin 1340. He says, "Polish and poulard wheats are among the most spectacular cereal crops in appearance, and the stories which have accompanied the exploitation of these two grains would excite the interest of the most indifferent farmer. Neither of these wheats is of commercial value in America but both have been offered many times and are still being offered to the buying public by unscrupulous or unknowing promoters who take advantage of their striking appearance. . . . Seed has been sold at such prices as \$1 a pound or \$60 a bushel with

claims for enormous yields of the wheat."

Dr. Martin further points out that these wheats yield about one-half to three-fourths as much as the standard varieties of wheat grown in the same places and in no locality have they equalled the yield of adapted varieties.

In quality the Polish and poulard wheats are among the poorest on the market. They are neither good for macaroni, bread, nor pastry. As a feed they have no superior characteristics and are therefore not recommended for any place in the United States.

Most wheat varieties lose their viability in 20 to 25 years, making the long storage claims false. Neither poulard nor Polish varieties appear to have been known before the Christian era, thus making their supposed origin questionable.

Most honest promoters would wish the

blessing and backing of state and federal research agencies connected with cereal breeding and testing. Full cooperation can be assured both farmers and private breeders who may wish to submit new varieties for testing. In the past many new cereal varieties have arisen to prominence through private breeders in which their new grain was tested by recognized testing agencies. Today breeding is more complicated with the incorporating of disease resistance, high yield, quality, and straw strength, into new releases.

A word of warning should be given to resist purchasing any new variety not recommended by the state agricultural experiment station and to seek advice from county agents or extension agronomists about growing new varieties, regardless of the claims made by promoters.

—R. W. Woodward

## CONTRIBUTIONS TO RESEARCH

November 15, 1952 to February 15, 1953

Sugar Research Foundation	\$2500 to continue the research on the improvement of dressing percentage and quality of meat from the feeding of sugar to livestock.
Damon Runyon Memorial Fund for Cancer Research	\$2300 for study of tumorous head in fruit flies.
American Dehydrators Association	\$2000 to investigate effect of feeding dehydrated and sun cured alfalfa to range ewes.
Intermountain Forest and Range Experiment Station	\$600 for study of the number, species, and germination capacity of seeds found under different age classes of Ponderosa pine.
Whirlaway Company, Harrisburg, Pa.	Whirlaway egg washer valued at \$193 for use at the Poultry Farm.